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# A New Species of *Mentzelia* Section *Bartonia* (Loasaceae) from Arizona

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**ABSTRACT.** A new species of *Mentzelia* sect. *Bartonia* (Loasaceae), *M. collomiae*, is described from central Coconino County, Arizona, U.S.A. It is an edaphic endemic species restricted to cinder areas of the San Francisco Volcanic Field and is distinguished from other species in the section by seed surface features and by a combination of gross morphology, chromosome number, and habitat.

*Mentzelia* sect. *Bartonia* (Sims) Gilg contains about 35 species of mostly western North American short-lived perennials. Ongoing studies in *M.* sect. *Bartonia* and preparation of the Loasaceae treatment for the Vascular Plants of Arizona project have confirmed the existence of a new species in Arizona. This taxon was apparently first recognized in the mid 1960s by H. J. Thompson and J. R. Zavortink, as indicated by their annotations of several specimens of this taxon as "*M. volcanicola*, n. sp." The same identification was given to other specimens in the mid 1970s in annotations by H. J. Thompson. Since this name was never validly published and since some of the specimens annotated as "*M. volcanicola*" represent *M. multiflora* (Nuttall) A. Gray, a different epithet is applied to this species.

***Mentzelia collomiae*** Christy, sp. nov. TYPE: U.S.A. Arizona: Coconino Co., ca. 3.5 mi. due N of Sunset Crater National Monument, T24N, R8E, NE 1/4 Sec 26, 6350 ft., 25 Sep. 1994, C. M. Christy 2385 (holotype, ASU; isotypes, MO, US).

Inter species sectionis *Bartoniae* ad *M. candelariam* H. J. Thompson & B. A. Prigge accedens sed cellulis testae multo magis colliculosis, staminodiis saepe praesentibus, solis natalibus omnino volcanicis, ab ea recedens.

Plant perennial from basal rosette, herbaceous to slightly suffrutescent; trichomes present nearly throughout, unicellular, barbed, the larger ones with surrounding cells enlarged, forming a basal pad. Stem 11–35 cm tall, 1–5 mm diam. near base, single (rarely 2), strict (occasionally arching from

weight of fruits or nearly prostrate due to shifting substrate); axillary branches developing to base of stem in robust plants. Leaves of basal rosette oblanceolate, 1–3.5(–5) cm long, 3–10 mm wide, the margins with blunt teeth or short lobes distally; lower cauline leaves oblanceolate or narrowly elliptic to lanceolate, 1.5–5 cm long, 3–8(–14) mm wide, the margins with 3 (2–4) teeth or lobes per cm; cauline leaves gradually reduced upwardly, deltoid; lobes of upper leaves mostly triangular and acute, the basal pair of lobes often enlarged and clasping; uppermost leaves forming bracts, linear-lanceolate, 0.7–1.4 cm long, the margins entire or 1–2-lobed. Flowers pedicellate, not clustered, subtended by 1–2 bracts, these sometimes fused to base of ovary. Calyx lobes narrowly triangular, 3–8 mm long. Petals 5, yellow, wide-spreading, spatulate (nearly linear), 5–11 mm long, 2–4 mm wide; apices obtuse (in wider petals) or acute (in narrower petals); trichomes at apices and adjacent margins only. Petaloid staminodia 3–5 (or 0 when bearing small but apparently functional anthers), distinctly narrower and usually shorter than petals, 4–10 mm long, 1–2 mm wide; apex acute to long-attenuate. Stamens 30–50; outermost 3–8 mm long, the inner ones shorter, those of outer whorls with slightly broadened filaments. Ovary 3-carpellate, (4–)6–10 mm long at anthesis; style (3–)5–7 mm long, the stigmatic grooves 1–2 mm long, their papillae few, short, not forming a visible tuft. Capsule cylindrical, crowned with persistent calyx and style; body 6–17 mm long. Seeds white to pale tan, oval or subrectangular to suborbicular, 1.8–2.6 mm long, 1.5–1.9 mm wide, the wing (0.15–)0.2–0.25 mm wide; testa cells (10× magnification) visible and appearing smooth; testa cells (100× magnification) nearly isodiametric, mostly regularly arranged, the radial walls straight, the tangential walls with a colliculate dome of 15–30 small coalesced bumps, the number varying with cell size. Chromosome number:  $n = 11$ .

**Phenology.** Flowering occurs from (June) July

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to October and is asynchronous within a population; mature fruits are usually present from late July through November. Flowers open during at least two days. They begin opening in early evening and close after dusk, with those opening for the first time following the pattern I have observed in other taxa of section *Bartonia* and opening later than older flowers. No pollinators have been observed.

**Distribution and habitat.** Known only from ca. 110 square miles of the San Francisco Volcanic Field in central Coconino County, Arizona, where it occurs on relatively undisturbed slopes and surrounding flats of volcanic cinder cones in and around Sunset Crater National Monument (SCNM; 35°15'–27'N; 111°22'–32'W). An isolated western population grows on a similar substrate at Red Mountain (35°31'N; 111°52'W), ca. 30 miles to the northeast of SCNM. This edaphic endemic species is restricted to a substrate consisting of black (occasionally reddish), volcanic cinders, with surface layers mostly ca. 1 cm in diameter. At SCNM, this substrate is less than 1000 years old (Breternitz, 1967), has little apparent soil development, and is commonly barren or only sparsely vegetated. *Mentzelia collomiae* has not been observed on black cinder substrates that are the consistency of coarse sand (e.g., at Merriam Crater) or on areas primarily composed of large, coarse cinders or lava fragments. The reddish coarse cinders with denser vegetation and visible soil development that characterize the majority of cinder cones outside the SCNM area also do not provide a suitable habitat. Dominant plants in the SCNM area commonly include *Pinus ponderosa* Douglas ex Lawson & C. Lawson, *P. edulis* Engelm., and *Juniperus* spp. Populations of *M. multiflora* occur in the vicinity of *M. collomiae* populations throughout its range, but the former are restricted to areas with evident soil build-up. I have seen no evidence of hybridization between these two taxa. Intermediate morphology, a lack of seed set, and sharply reduced pollen stainability characterize hybrids within *M. sect. Bartonia* (e.g., Thompson, 1963; Thompson & Zavortink, 1968).

In *Mentzelia*, seed surface sculpturing patterns are potentially diagnostic at the species level (Hill, 1976). This is true for *M. collomiae*, and this pattern, its chromosome number and floral morphology place it within a group of species that includes *M. candelariae*. *Mentzelia candelariae* occurs mostly on clay soils in western Nevada (Thompson & Prigge, 1984). The surface sculpturing of its seeds is more

coarsely colliculate and it has five broadened stamens but no petaloid staminodia. *Mentzelia multiflora* is normally a much larger, more robust plant that can be readily distinguished from *M. collomiae* by its larger flowers (petals commonly 15–20 mm long) and testa cells with highly sinuate radial walls.

The specific epithet honors Rose E. Collom, an amateur botanist in Arizona during the 1930s and one of the first to collect this species.

**Paratypes.** U.S.A. **Arizona:** Coconino County, Sunset Mtn. at Flagstaff, 21 Aug. 1915, *Rusby s.n.* (NY); near Sunset Crater, 7000 ft., 1 July 1937, *Collom 743* (ASU, DES); Wupatki Nat'l. Mon., top of cinder cone, 7000 ft., 27 July 1939, *Jones s.n.* (ARIZ); SCNM, NE of Flagstaff, 14 Aug. 1950, *Deaver 2986* (ASC); SCNM, NE of Flagstaff, 7000 ft., 18 July 1959, *Carson 23* (ASC); S side of Sunset Cone, SCNM, 7400 ft., 24 June 1964, *Eggler 839* (MNA); Red Mountain, 35 mi. NW of Flagstaff on Hwy. 180, 7400 ft., 10 Aug. 1978, *Peterson 78-91* (MNA); 0.5 mi. E of SCNM, T23N, R9E, Sec19, 6800 ft., 7 Oct. 1990, *Christy 432 & Parfitt* (ASU); ENE of Flagstaff, Cochrane Hill cinder pit, ca. 0.5 mi. N of Leupp Rd., T22N, R10E, SW 1/4 Sec19, 6350 ft., 15 Aug. 1991, *Christy 842* (ASU, TEX); ENE of Flagstaff, ca. 1.5 mi. due N of Leupp Rd. along Forest Rd. 244, T22N, R9E, SW 1/4 Sec15, 6400 ft., 12 Sep. 1992, *Christy 1152* (ASU); 4 mi. SE SCNM along Forest Rd. 498, T22N, R9E, SE 1/4 Sec5, 6900 ft., 12 Sep. 1992, *Christy 1155* (ASU); ENE of Flagstaff, ca. 4 road-mi. N of Leupp Rd. along Forest Rd. 244, T22N, R9E, NW 1/4 Sec15, 6500 ft., 6 Sep. 1993, *Christy 1878* (ASU); NE side of Red Mtn., ca. 35 mi. NW of Flagstaff, T25N, R4E, Sec21–22, 7200 ft., 24 Sep. 1994, *Christy 2372* (ASU, LA); ca. 3.5 mi. due N of SCNM, T24N, R8E, Sec25, 6200 ft., 24 Sep. 1994, *Christy 2383* (ASU); 2.5 mi. N of SCNM, cinder ridge just NW of Black Mtn., T24N, R8E, Sec36, 6400 ft., 24 Sep. 1994, *Christy 2384* (ASU, WS).

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